

CLAIMS

1. A semiconductor laser element, comprising:
a first cladding layer with a first conductive type;
a second cladding layer with a second conductive type different
5 from the first conductive type, provided on said first cladding layer;
an active layer provided between said first and second cladding
layers;

a light emitting face which corresponds to one end face of said
active layer; and

10 a light reflecting face which corresponds to the other end face
opposing one end face of said active layer and is arranged such that a
first normal line passing through the center thereof is substantially in
parallel with a second normal line passing through the center of said
light emitting face,

15 wherein said second cladding layer has a ridge portion for
forming a refractive index type waveguide of which both end faces
correspond to said light emitting face and said light reflecting face
respectively, in said active layer, a part of said ridge portion, excluding
at least both edges thereof, extending in a direction crossing the first and
20 second normal lines at an angle equal to or less than the complementary
angle θ_c of the total reflection critical angle on the side face of said
refractive index type waveguide respectively.

2. A semiconductor laser element according to claim 1,
wherein said light emitting face and said light reflecting face are
25 arranged in a state where the first normal line and second normal line
match.

3. A semiconductor laser element according to claim 1, wherein said light emitting face and said lighting reflecting face are arranged in a state where the first normal line and second normal line are apart from each other in a predetermined distance.

5 4. A semiconductor laser element according to any one of claims 1 to 3, wherein the distance between said light emitting face and said light reflecting face, and the maximum width of said ridge portion along the direction perpendicular to the first and second normal lines are set such that light components which resonate in said refractive index
10 type waveguide between said light emitting face and said light reflecting face are reflected for a same number of times respectively on a pair of side faces facing each other of said refractive index type waveguide.

15 5. A semiconductor laser element according to any one of claims 1 to 4, wherein at least one of the edge of said light emitting face side and the edge of said light reflecting face side of said ridge portion extends along the first and second normal lines respectively.

20 6. A semiconductor laser element according to any one of claims 1 to 5, wherein an angle θ formed by each of the first and second normal lines and a direction in which said ridge portion, excluding both edges, extends is within the following range: $\theta_c - 1^\circ \leq \theta \leq \theta_c$.

25 7. A semiconductor laser element according to any one of claims 1 to 6, wherein the angle θ formed by each of the first and second normal lines and the direction in which the part of said ridge portion, excluding both edges thereof, extends substantially matches with the complementary angle θ_c of the total reflection critical angle.

8. A semiconductor laser element according to any one of

claims 1 to 7, further comprising wavelength selection means for selecting a wavelength of light components which resonate in said refractive index type waveguide.

5 9. A semiconductor laser element according to claim 8, wherein said wavelength selection means includes a periodic diffraction grating provided along at least a part of said refractive index type waveguide.

10 10. A semiconductor laser element according to claim 8 or 9, wherein said wavelength selection means includes a dielectric multilayer film provided on at least one face of said light emitting face and said light reflecting face.

15 11. A semiconductor laser element according to any one of claims 8 to 10, wherein said wavelength selection means includes a wavelength selecting element provided so as to face at least one face of said light emitting face and said light reflecting face.

20 12. A semiconductor laser element array, comprising a plurality of semiconductor laser elements each having the same structure as a semiconductor laser element according to any one of claims 1 to 11, wherein said plurality of semiconductor laser elements are arranged along the direction perpendicular to the first and second normal lines.